



Research Regarding Browntail Moth's Attraction to Artificial Light

UMaine's Forest Entomology Lab Aims to Reduce the Public's Risk of Getting the Browntail Moth Rash

Highlights

Maine can experience outbreaks of the browntail moth (BTM), an invasive insect that has multiple impacts:

- 1. Ecological Impacts** – BTM feeds on the leaves of over 50 hardwood species. Tree mortality can occur with repeated defoliation over multiple years.
- 2. Public Health Impacts** – BTM caterpillars contain toxic hairs that cause a poison ivy-like rash. The hairs easily become airborne and can remain toxic in the environment for years.
- 3. Economic Impacts** – BTM can negatively impact recreation and tourism in the state due to its public health risks. BTM can also attack fruit trees, causing problems for apple orchards in the region.

Key Research Takeaway

Browntail moths are strongly attracted to artificial lights

- Turning off outdoor lights or changing outdoor lightbulbs during BTM's flight season could reduce the number of winter webs on your property, which would mean less caterpillars the following spring and reduced risk of getting the rash

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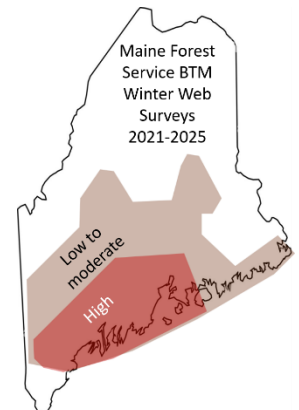
BACKGROUND

Browntail moth (BTM) is an invasive species from Europe that was accidentally introduced to the Boston area in the late 1800s. It is a significant defoliating pest of over 50 hardwood trees, with a preference for oaks and fruit trees such as crabapple and cherry. In addition, the caterpillars have toxic hairs that can result in a painful rash; these hairs easily come loose and can remain toxic in the environment after the caterpillars are no longer visible. For decades following its introduction, management efforts, including the clipping of winter webs, spraying of pesticides, and introduction of BTM's natural enemies from Europe, were able to slow the spread and eventually eradicate BTM from mainland New England. After the 1960s, BTM was only found on some islands in the Casco Bay region of Maine and the tip of Cape Cod in Massachusetts.



BROWNTAIL MOTH IN MAINE

Browntail moth experiences eruptive outbreaks, where populations explode for a number of years before they go back to being hard to find. In Maine, BTM populations have become problematic about every 10-15 years, with state-level outbreaks lasting 3-10+ years, but localized hotspots typically lasting less than 5 years. The most recent outbreak began in 2015 and has resulted in the spread of BTM to parts of Maine that have not seen it in over 75 years.



BROWNTAIL MOTH LIFE CYCLE

Browntail moth has 1 generation per year. Adults will emerge in late June or early July, and females will lay their egg mass, which appear 'hairy', on individual leaves at the tips of branches, typically at the tops of trees. Caterpillars will hatch in late summer and work together to build their winter web out of silk-wrapped leaves – they will hibernate over the winter in these webs. Once all of the leaves have dropped in the fall, the white silk on the webs can be observed reflecting in the sunlight. Each winter web can contain hundreds of caterpillars, making web removal in the winter an effective way to reduce impacts. In the spring, caterpillars will emerge and begin feeding on fresh leaves as buds expand. As they get bigger, their impacts become more pronounced, including exposure to toxic hairs and an increased risk of getting the rash.



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Donations to support UMaine BTM Research may be sent to:
The University of Maine Foundation
2 Alumni Place, Orono, ME 04469
Please indicate funds are specifically for the Browntail Moth Project

ABOUT UMAINE

The University of Maine, founded in Orono in 1865, is the state's premier public university. It is among the most comprehensive higher education institutions in the Northeast and attracts students from across the U.S. and 65 countries. UMaine students directly participate in groundbreaking research working with world-class scholars. The University of Maine offers doctoral degrees in 35 fields, representing the humanities, sciences, engineering and education; master's degrees in nearly 70 disciplines; and 90 undergraduate majors and academic programs.

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BROWNTAIL MOTH RESOURCES

www.maine.gov/foresthealth

- Background information
- Life cycle updates
- Survey maps
- Frequently asked questions
- List of licensed pesticide applicators & arborists that treat BTM



BROWNTAIL MOTH'S ATTRACTION TO ARTIFICIAL LIGHT

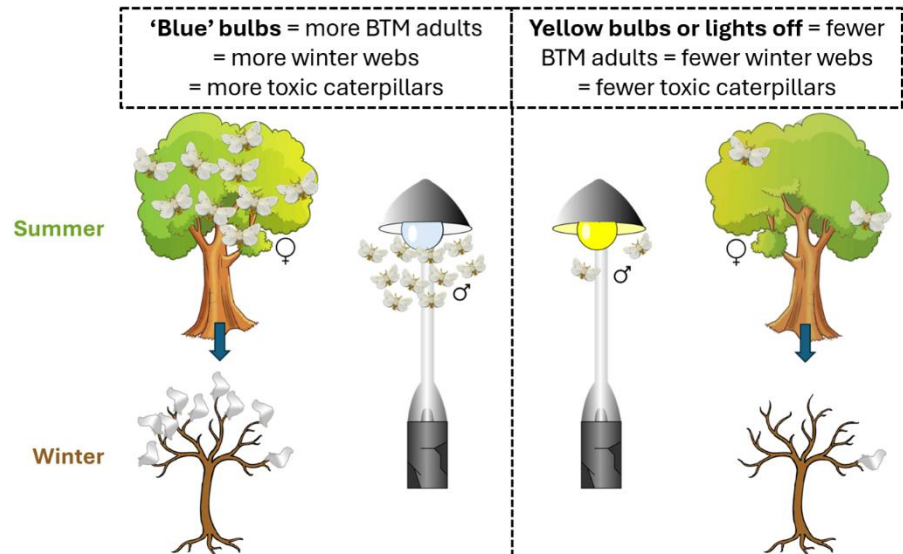
With peak emergence occurring in late June-early July, BTM adults can be found in high densities swarming around outdoor lights. When the sun comes up, these moths can still be found motionless at the lights. The majority (up to 100%) of adult moths at lights are male. This is most likely due to the difference in flight activity between male and female BTM – females are much larger with poorer flight capabilities. Instead of flying around light sources, females have been observed waiting for males on tree branches.



Research Questions:

1. What commercially-available light bulbs are the most attractive to BTM?
2. Are more females laying their egg masses in trees closer to outdoor lights?

Moths were tested for their attraction by putting them in a chamber where they had to make a choice between bulbs. Five different bulbs were tested: compact fluorescent, incandescent, yellow LED, cool-white LED, and warm-white LED. Results found that the bulbs that emitted wavelengths in the blue-violet-ultraviolet (UV) part of the spectrum were the most attractive to BTM. This included incandescent, compact fluorescent, and cool-white light bulbs. When moths were given the choice between a cool-white, warm-white, or yellow LED bulb, not a single moth selected the yellow LED. When given only a yellow LED bulb, nearly two thirds of the moths stayed in the dark rather than go to the yellow bulb. Because yellow LED bulbs do not emit any blue or UV light, it supports the conclusion that BTM appears to be attracted to blue or shorter wavelengths.

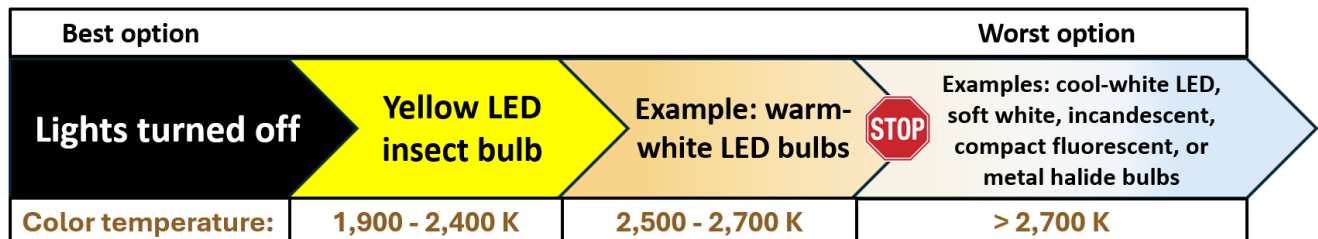


Additional research looked at hundreds of trees and counted the number of winter webs per tree while also determining the tree's distance to the nearest outdoor light source. Results found that trees closer to lights had a higher number of winter webs, with the most infested trees within 20 meters of a light source having 2-4 times as many winter webs as the most infested trees 60-80 meters from lights. This indicates that female BTM may also be attracted to lights, but don't go directly to them.

RECOMMENDATIONS

Best: turn off outdoor lights from mid-June to mid-August (BTM's flight season). If you prefer not to turn off your lights, consider changing your lightbulbs to something less attractive to BTM:

1. **Least attractive to BTM:** Yellow LED insect light bulbs, available at most local retailers (color temp < 2,400 K).
2. **Less attractive to BTM:** Warm-white LED bulbs (color temp 2,500 – 2,700 K).
3. **Most attractive to BTM:** Any lightbulb bulb with a color temp greater than 2,700 K. This includes cool-white LED, incandescent, and compact fluorescent bulbs, which emit higher proportions of blue to UV wavelengths.



NOTE: Avoid using bug-zappers or other light traps to attract and kill BTM. The light associated with these devices can attract more female BTM to your property, which can hang out in the trees rather than going to the trap, leading to more winter webs in your trees. In addition, these devices are not specific to BTM and can kill native moths as well as insects that help control BTM.